

# Essays on the role of knowledge, R&D, and Technology-based firms in the evolution of socio-techno-economic system

Citation for published version (APA):

Shafique, M. (2016). *Essays on the role of knowledge, R&D, and Technology-based firms in the evolution of socio-techno-economic system*. [Doctoral Thesis, Maastricht University]. Universitaire Pers Maastricht. <https://doi.org/10.26481/dis.20160419ms>

## Document status and date:

Published: 01/01/2016

## DOI:

[10.26481/dis.20160419ms](https://doi.org/10.26481/dis.20160419ms)

## Document Version:

Publisher's PDF, also known as Version of record

## Please check the document version of this publication:

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*Propositions accompanying the PhD thesis*

**Essays on the Role of Knowledge, R&D, and Technology-Based Firms  
in the Evolution of Socio-Techno-Economic System**

*By*

**Muhammad Shafique**

1. Technological change can be understood better through the knowledge-based view than the artifact-based view of technology and technological systems.
2. Transformative technological change (TTC) occurs due to the structural change in the universe of knowledge and ultimately manifests in the structural change in the socio-techno-economic system.
3. Structural change in the universe of knowledge emerges from the changes in the zeitgeists and paradigms.
4. Zeitgeists and paradigms tend to change due to radical discoveries, inventions and innovations.
5. Radical discoveries, inventions and innovations tend to occur when explorers transcend their existing domains of experience.
6. Invention and innovation need the compass more often than the map.
7. Technology-based firms (TBFs) tend to benefit more from the technological M&As when they seek complementary knowledge bases for exploring technological opportunities beyond their existing domains of experience.
8. Technological profile and output of TBFs is determined by the interaction between the intended and emergent technological opportunities.
9. Information provides hindsight, knowledge arises out of insight, and wisdom emerges from the combination of both. Foresight is the fruit of wisdom.
10. One of the greatest challenges in the practice of science as well as technology is to escape the gravitational force of zeitgeists and paradigms.
11. Good is created when economic being serves the social being; tragedy is born when the economic being serves itself at the cost of, or to the neglect of, the social being.